



**AAR-100**

**Human Factors Newsletter # 02-13**

**July 13, 2002 – July 26, 2002**

**Human Factors Research Grant Awards (June/July 2002)–**

- **State University of New York (SUNY) -**

**Project Summary:**

The FAA seeks to establish a method for determining whether language barriers result in maintenance deficiencies. The route of outsourcing aviation maintenance is being taken by Federal Aviation Regulation (FAR) Part 145 operators in the USA and similarly certified operators abroad. In both cases, a number of the people performing, inspecting and supervising maintenance work do not have English as their native language, which could increase the probability of language-related errors. Prior research on comprehension of work documentation has shown that non-native English speakers have higher error rates, and that the restricted language “Simplified English” can eliminate this deficit.

Phase I of this research project provides a comprehensive literature review of language-related errors, both in the aviation domain (e.g. cockpit and ATC communications) and within the background literature on language skills. From an initial literature review have come several potential taxonomies of communications errors that could form the basis for maintenance and inspection related errors. Researchers will collect data from FAR Part 145 operators in North / Central America, Asia and Europe using focus groups to classify patterns of maintenance errors related to language, the antecedents of the errors, and the system recovery modes for these errors. At the same sites, researchers will collect data on overall error frequencies, and test the comprehension error methodology to be used in Phase II of the grant to quantify the effectiveness of various intervention strategies. There will be a Phase I report analyzing this data and determining whether language-related errors are a significant contribution to maintenance deficiencies.

Phase II will again visit FAR Part 145 operators in the same regions to collect specific frequency data on each of the error patterns, and measure the effectiveness of recovery / mitigation strategies in improving written, and perhaps also verbal, comprehension of maintenance related documentation. Researchers will use a questionnaire to maintenance personnel listing the error patterns and determining frequency data for each pattern. They

will also use the comprehension test methodology to test for the effectiveness of “Simplified English”, provision of coaching by more facile English speakers, and a maintenance glossary or even full translation in error reduction. These methods will be tested in factorial combination where appropriate.

The final report will provide refined estimates of error frequency, patterns of error types, effectiveness of intervention strategies and recommendations for FAA action to mitigate language related errors. (W. Krebs, AAR-100)

- **Massachusetts Institute of Technology**

**Project Summary:**

The oceanic air travel environment is expected to evolve and expand significantly over the next decade, and will need to take advantage of enhanced communications, navigation and surveillance capability to improve safety, efficiency and security. It is critical to include human factors considerations in the evaluation and development of future oceanic air transportation systems that include these capabilities.

The first steps toward oceanic modernization have already been taken with programs in the US and Iceland as well as in the Pacific region. Within the US, the Advanced Technologies and Oceanic Procedures Program is the core FAA program to modernize and address mission needs for oceanic operations. In Iceland, a new flight data processor system and an integrated sensor plan situation display have become operational.

Due to the expected emergence of ADS-B in both domestic and oceanic applications, the FAA Oceanic Integrated Product Team has identified information requirements of the oceanic controller in potential ADS-B environments as a key research need. This research grant will utilize the integrated human-centered system approach to guide development and monitor the impact of new technologies such as ADS-B for the future oceanic air transportation system.

The operational emergence of ADS-B in Oceanic Airspace raises a number of potential issues that will be addressed in the initial phase of this research effort. These issues include potential changes in the operational role of the controller in using ADS-B and changes in procedures between controllers and pilots having a cockpit display of traffic information. Research will address controller and pilot display interpretation and use of ADS-B information in a mixed equipage environment relative to ADS-B concepts of use. Research will examine the implications of transitioning from procedure-based separation assurance to one where ADS-B provides accurate and frequent aircraft position information supporting reduced separation. Decision criteria need to be defined and measured related to the acceptance and certification of ADS-B applications.

A second goal of this effort will be to address human performance issues. These issues include the human performance costs and benefits associated with ADS-B such as changes in

situation awareness, training, and skill maintenance and vigilance. Research needs to examine how ADS-B affects controller workload during normal and non-normal operations.

The expected results from the first phase of the proposed effort will be a human-centered analysis addressing the key issues and elements identified above. In addition, a comparative analysis of the future oceanic air transportation functional requirements, needs, and issues between the US and Iceland is expected.

One unique aspect of the proposed research is that it will be conducted in parallel with a related effort in Iceland. Students at both MIT and the University of Iceland will work on key information systems issues associated with the future oceanic air transportation systems from the perspective of each country's needs (e.g. current focus on ADS-B). The students will interact on a periodic basis and provide support and feedback to each other. Other international partners such as EUROCONTROL may be encouraged to participate in the future. This approach should ensure that approaches to Oceanic Air Traffic control are consistent across the North Atlantic. (P. Krois, AAR-100)

**FAA/NASA Human Factors Weather Research Coordination Effort:** On July 10 and 11, 2002, over 30 engineers, meteorologists and human factors scientists from FAA, NASA and industry held the third meeting of a newly established research coordination effort focused on human factors aviation weather research at the NASA-Langley Research Center. The first two meetings, which were held on August 7 and 8, 2001, and February 21 and 22, 2002 also took place at the NASA-Langley Research Center, and interest in the effort has since grown. It is planned that future meetings will take place on a semiannual basis. The goal of the effort is to bring FAA/NASA engineers, meteorologists and human factors researchers together, provide an opportunity to discuss work relating to aviation weather information and technologies, and coordinate efficient and effective methods of attaining common research objectives through a systematic approach to the NAS. Through coordinated research efforts, it is anticipated that research duplication will be avoided and more focused research objectives can be identified. Future meetings will be held in locations that will give the group a chance to see the broadest scope of human factors weather research. It is tentatively planned that the next meeting will be held at the FAA's William J. Hughes Technical Center in February 2003. The FAA R&D Field Office (AAR-210) at the NASA-Langley Research Center, has agreed to host the research coordination effort's web site (<http://HFWX.larc.nasa.gov>). Meeting information and presentations may be accessed or downloaded and shared by the effort's FAA and NASA participants and other interested employees. The point of contact for the effort is Dr. Raymon M. McAdaragh (757) 864-1941, [r.mcadaragh@larc.nasa.gov](mailto:r.mcadaragh@larc.nasa.gov).

**NEXCOM Latency Study:** Human factors researchers at the William J. Hughes Technical Center (ACB-220) briefed a combined session of the Radio Technical Commission for Aeronautics (RTCA) with Special Committees SC-198 Next Generation Communications and SC-172 VHF Air-Ground Communication on July 9, 2002. The RTCA, Inc. is a private, not-for-profit corporation that advises the FAA, and includes over 270 government, industry, and academic organizations from the United States and around the world. The research team presented the results of the VHF Digital Link Mode 3 (VDL3) Latency Study conducted in the Technical Center's Research Development and Human Factors Laboratory in April, 2002. The

results of the study will be used to establish NEXCOM VDL3 delay performance requirements. (R. Sollenberger, WJHTC).

**Air Transportation Human Factors:** The *Air Transportation Human Factors Research Review June 2002* is available on-line by accessing “Spotlight Features” at <http://www.hf.faa.gov> (E. Edens, AFS-230)

**Realistic Radio Communications:** A paper entitled *Simulated Air and Ground Traffic Environment for Flight Training* was presented to the IATA Flight Simulator Working Group meeting in June 2002. The author, Michael Brown of United Airlines, proposes a standard describing the characteristics and functionality of a simulated aircraft communication environment for use at all levels of synthetic flight training. The paper contains extensive quotes and references to research currently underway by FAA human factors researchers. Information on this paper may be obtained at the following e-mail address: <mailto:eleanae@aol.com> (E. Edens, AFS-230)

*More information on human factors research can be found at the FAA Human Factors (AAR-100) web site: <http://www.hf.faa.gov>*

Mark D. Rodgers  
FAA (AAR-100)



**August 5-8, 2002** – AIAA Guidance, Navigation and Control Conference and Exhibit, Hyatt Regency Monterey, Monterey, CA <http://www.aiaa.org/>

*August 8-10, 2002* – 24<sup>th</sup> Meeting of the Cognitive Science Society (CogSci 2002), George Mason University, Fairfax, VA <http://www.hfac.gmu.edu>

**August 22-25, 2002** – 110<sup>th</sup> Convention of the American Psychological Association, Hilton Chicago Hotel/Hyatt Regency McCormick Place Hotel, Chicago, IL  
<http://www.apa.org/convention>

**August 27-29, 2002** – 4<sup>th</sup> Workshop on Risk Analysis and Safety Performance, Atlantic City, NJ  
<http://aar400.tc.faa.gov/aar424/workshop2002>

**August 27-30, 2002** – Measuring Behavior 2002, 4<sup>th</sup> International Conference on Methods and Techniques in Behavioral Research, University of Amsterdam, Amsterdam, The Netherlands  
<http://www.noldus.com/events/mb2002/index.html>

**September 16-18, 2002** – Conference on Aerospace Materials, Processes and Environmental Technology, Huntsville, AL <http://ampet.msfc.nasa.gov/>

**September 17-18, 2002** – FAA R,E&D Advisory Committee, Holiday Inn Rosslyn Westpark Hotel, Arlington, VA <mailto:gloria.ctr.dunderman@faa.gov>

**September 17-20, 2002** – International Air Cargo Forum, Hong Kong <http://www.tiaca.org/>

**September 29- October 4, 2002** – Human Factors and Ergonomics Society 46<sup>th</sup> Annual Meeting, Baltimore Waterfront Marriott Hotel, Baltimore, MD <http://www.hfes.org/>

**September 30 – October 1, 2002**- FAA R,E&D Advisory Committee (REDAC) Meeting, Holiday Inn Westpark, Rosslyn, VA [http://research.faa.gov/aar/redac\\_meetings.asp](http://research.faa.gov/aar/redac_meetings.asp)

**October 10-19, 2002** – The World Space Conference, Houston, TX [www.aiaa.org/wsc2002](http://www.aiaa.org/wsc2002)

**October 14-16, 2002** – Third LOSA Week, Dubai, United Arab Emirates  
<mailto:dmaurino@icao.int>

**October 21-24, 2002** – 2<sup>nd</sup> Annual FAA Centers of Excellence Meeting, Wichita, KS  
<http://www.niar.twsu.edu/faacoe>

**October 23-25, 2002** – International Conference on Human-Computer Interaction in Aeronautics, Massachusetts Institute of Technology, Cambridge, MA <http://www-eurisco.onecert.fr/events/hci-aero2002.html/>

**October 27-31, 2002** – 21<sup>st</sup> Digital Avionics Systems Conference, Hyatt Regency Hotel, Irvine, CA <http://www.dasconline.org/>

*November 21-24, 2002* – 43<sup>rd</sup> Annual Meeting of the Psychonomic Society, Hyatt and Westin Hotels, Kansas City, MO <mailto:psp@psychonomic.org>

*December 10-14, 2002* – Neural Information Processing Systems 2002, Vancouver, Canada  
<http://www.nips.cc/>

*April 5-10, 2003* –CHI 2003 Conference on Human Factors in Computing Systems, Broward Convention Center, Ft. Lauderdale, FL <http://www.chi2003.org/>

**April 7-27, 2003** – Aviation World's Fair, Newport News/Williamsburg, VA  
<http://www.worlds-fair.com/> or <http://aviation-worlds-fair.com/>

*April 27-30, 2003* – Symposium on Interactive 3D Graphics, Monterey Marriott, Monterey, CA  
<mailto:Pausch@cmu.edu>

*May 3-10, 2003* – International Conference on Software Engineering, Hilton Portland, Portland, OR  
<mailto:ldillon@cse.msu.edu>

**May 4-9, 2003** – 74<sup>th</sup> Annual Scientific Meeting of the Aerospace Medical Association, Convention Center, San Antonio, TX <http://www.asma.org/>

*May 12-17, 2003 - 2003 IEEE International Conference on Robotics and Automation, The Grand Hotel, Taipei, Taiwan <http://www.icra2003.org/>*

*June 22-27, 2003 – 10<sup>th</sup> International Conference on Human-Computer Interaction, Institute of Computer Science Foundation, Research and Technology, Science and Technology Park of Crete, Heraklion, Crete, Greece <mailto:info@hcii2003.gr>*

*June 24-26, 2003 – Human Systems Integration Symposium “Enhancing Human Performance in Naval and Joint Environments”, Sheraton Premier Hotel, Tyson’s Corner, VA <http://www.navalengineers.org/>*

**July 14-17, 2003** – AIAA/ICAS International Air & Space Symposium and Exposition, Dayton Convention Center, Dayton, OH <http://www.flight100.org/>

**August 7-10, 2003** – 111<sup>th</sup> Convention of the American Psychological Association, Toronto, Ontario, Canada <http://www.apa.org/convention>

**October 13-17, 2003** – Human Factors and Ergonomics Society 47<sup>th</sup> Annual Meeting, Adams Mark Denver Hotel, Denver, CO <http://www.hfes.org/>

**May 2-7, 2004** – 75<sup>th</sup> Annual Scientific Meeting of the Aerospace Medical Association, Egan Convention Center, Anchorage, AK <http://www.asma.org/>

**September 20-24, 2004** – Human Factors and Ergonomics Society 48<sup>th</sup> Annual Meeting, Sheraton New Orleans Hotel, New Orleans, LA <http://www.hfes.org/>

*Note: Calendar events in Italics are new since the last Newsletter*



Comments or questions regarding this newsletter?  
Please contact Bill Berger at (334) 271-2928  
or via e-mail at [bill.ctr.berger@faa.gov](mailto:bill.ctr.berger@faa.gov)